REMARKS

By the above amendment, in light of the objection to claim 21, claim 21 has been amended to utilize "means for" language where appropriate. Accordingly, the objection to claim 21 should now be overcome.

As to the Examiner's indication that the information disclosure statement filed on July 8, 2003 fails to comply with the provisions of 37 CFR 1.97, 1.98 and MPEP §609, applicants note the listing and documents submitted were submitted in compliance with the duty of disclosure under 37 CFR 1.56, and should be considered for such purposes. Thus, it is recognized that the documents and submission did not comply with the provisions of 37 CFR 1.97, 1.98 and MPEP §609, and were not intended to comply with such provisions. Furthermore, it is noted that the publication submitted is described at page 3, line 16 et. seq. of the specification and the patent submitted was also submitted in the information disclosure statement filed November 18, 2004, which has been considered by the Examiner.

As to the rejection of claims 1 - 12, 20 and 21 under 35 USC 103(a) as being unpatentable over US Patent No. 6,980,846 B2 (herein referred to as Hardy et al), in view of US Patent No. 6,687,528 B2 (herein referred to Gupta et al) and the rejection of claims 13 - 19 under 35 USC 103(a) as being unpatentable over Hardy et al in view of Gupta et al, and further in view of US Patent No. 5,668,474 (herein referred to as Heid), such rejections are traversed insofar as they are applicable to the present claims and reconsideration and withdrawal of the rejections are respectfully requested.

As to the requirements to support a rejection under 35 USC 103, reference is made to the decision of In re Fine, 5 USPQ 2d 1596 (Fed. Cir. 1988), wherein the

court pointed out that the PTO has the burden under '103 to establish a prima facie case of obviousness and can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. As noted by the court, whether a particular combination might be "obvious to try" is not a legitimate test of patentability and obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination. As further noted by the court, one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.

Applicants note that the present invention, as recited in the independent and dependent claims of this application, is directed to an inspection apparatus using nuclear magnetic resonance which enables executed of multi-slice and multi-frame cardiac imaging of a heart without giving any load on a subject. That is, the present invention enables acquires echoes while monitoring motion of a subject without using ECG-gated scans, for example. In accordance with the present invention as recited in independent claim 1, for example, a controller controls a pulse sequence applying a radio frequency magnetic field and a magnetic field gradient to a living body placed in a static magnetic field to detect a nuclear magnetic resonance signal produced from the living body, wherein the controller performs (1) in the state that the living body stops exhalation or inspiration, control of a first pulse sequence detecting the nuclear magnetic resonance signal to acquire a reference projection of an imaging section as the reference of monitoring of respiratory motion of the living body, (2) in the state that the living body breathes, control of executing once the first

pulse sequence detecting the nuclear magnetic resonance signal to acquire a projection of the imaging section used for the monitoring and in the state that the living body breathes, of repeating a second pulse sequence detecting the nuclear magnetic resonance signal to acquire an image of the imaging section at predetermined repetition time intervals, and (3) control of collecting the nuclear magnetic resonance signals used for imagery construction of the imaging section in the second pulse sequence based on a similarity coefficient between the projection and the reference projection. It is noted that Figs. 4 - 7, for example, describe the manner of obtaining a reference projection and the projection with Fig. 6(C) illustrating the obtaining of the similarity coefficient. As is apparent, the similarity coefficient is scaler, and the time for calculating the similarity coefficient is short, which results in shortening of the processing time without giving any load to a subject or living body to be inspected. The specification describes the obtaining of the similarity coefficient which is utilized, as described in connection with Fig. 6(C) at page 28, lines 18 - 27 of the specification, and the graph of the linear correlation coefficients (similarity coefficients) in Fig. 6(C) shows the result of a moving average of 15 linear correlation coefficients, and from the graph, the change in the linear correlation coefficient in synchronization with breathing of a subject can be read, whereby the linear correlation coefficient is close to 1 at exhalation, and is smaller at inspiration, whereby respiratory motion of the subject can be monitored using the linear correlations. As described at page 30 of the specification in connection with Fig. 7, which shows an actual pulse sequence, and in connection with Fig. 8, a reference projection is acquired, Rth is calculated and a similarity coefficient is calculated, whereby when the similarity coefficient is larger than Rth, echoes are acquired. Applicants submit that these features are recited in the independent and

dependent claims of this application and such features are not disclosed or taught in the cited art, as will become clear from the following discussion.

Turning to Hardy et al, as noted by the Examiner, while Hardy et al utilizes a comparison which "is not done by using a similarity coefficient in particular" (emphasis added), the Examiner contends that it would be obvious to use any sort of comparison method to obtain the proper images. Applicants submit that Hardy et al, in column 5, lines 11 - 42, describes "The comparison between the reference and free-breathing interleaves is desirably accomplished through use of two-dimensional cross correlation". (emphasis added). Fig. 3 of Hardy et al shows the steps carried out, noting that the reference data set acquired in step 310 uses ECG-gated interleaved spiral MRI, as described at column 4, lines 1 - 5 of Hardy et al, wherein, as described at column 5, lines 12 - 42, a set of cross-correlation kernels are generated in each of the breath-held or reference sub-images and the cross-correlation kernels are then cross-correlated with each of the corresponding free-breathing sub-images. As described, in practice, the cross-correlation is desirably done by multiplication in the Fourier domains (by use of the correlation theorem) in order to speed up the computation by as much as several orders of magnitude. Then, if the feature of interest is present in any of the free-breathing sub-images, then the cross-correlation will reveal a strong central peak (column 5, lines 10 - 25). Thus, Hardy et al discloses a comparison of images via computation of two-dimensional information, whereas the present invention controls the process based on a similarity coefficient between the projection and the reference projection, which similarity coefficient is based upon calculation of scaler information. Irrespective of the contentions by the Examiner, Hardy et al does not disclose or teach the recited features of the independent and dependent claims of this application, wherein a

similarity coefficient is determined between the projection and reference projection which achieves a shortening of processing time. Thus, applicants submit that all claims patentably distinguish over Hardy et al in the sense of 35 USC 103 and all claims should be considered allowable thereover.

The Examiner, recognizing the deficiencies of Hardy et al, indicates that Gupta et al discloses using correlation coefficients to determine the proper images to use with a cut-off, referring to column 7, lines 50 - 55 of Gupta et al. The Examiner concludes that it would be obvious to one with ordinary skill in the art at the time of the invention to combine Gupta et al with Hardy et al as both inventions are related to MR imaging of moving organs and using ECG-gated scans to minimize noise. Thus, the Examiner recognizes that Gupta et al, like Hardy et al, utilizes ECG-gated scans, which is not utilized in accordance with the present invention. Moreover, in view of Gupta et al, as described at column 7, lines 50 - 55, nine images were combined to generate a relaxation-time image using a pixel by pixel by fixed curved fitting algorithm, in which the correlation coefficient cut-off was established to minimize the inclusion of vessel voxels. Applicants submit that the correlation coefficient of Gupta et al is a value showing the accuracy of the function fitting, and has no relation with the cross-correlation of Hardy et al. Thus, applicants submit that the Examiner's proposed combination of Gupta et al and Hardy et al represents a hindsight reconstruction attempt utilizing the principle of "obvious to try" which is not the standard of 35 USC 103, (see In re Fine, supra), and which does not provide the claimed features, as set forth in the independent and dependent claims of this application. Accordingly, applicants submit that all claims patentably distinguish over this proposed combination of references in the sense of 35 USC 103 and should be considered allowable thereover.

Again, recognizing the deficiencies of Hardy et al and Gupta et al, the Examiner contends that the deficiencies of such cited art are overcome by the addition of Heid, which discloses a pulse sequence in which the read out magnetic field gradient and the phase encoding magnetic field has alternating polarities. Applicants note that Heid describes a readout gradient with sub-pulses with changing polarity activated between two radio frequency pulses and a nuclear magnetic resonance signal in the form of an echo arises under each sub-pulse as indicated in the abstract of this patent. While the Examiner contends that it would be obvious to combine Heid with Hardy et al and Gupta, applicants submit that Heid, like Hardy et al and Gupta et al, fails to disclose or teach the recited features of the present invention including the determination of a similarity coefficient between the projection and the reference projection, obtained in the manner set forth, which enables a shortening of the processing time. Thus, applicants submit that the proposed combination also fails to provide the recited features of the independent and dependent claims of this application, and all claims should be considered allowable thereover.

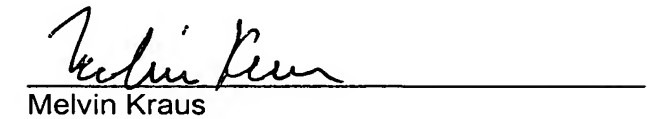
In view of the above amendments and remarks, applicants submit that the objection to claim 21 should now be overcome, and all claims patentably distinguish over the cited art, such that an action of favorable nature is courteously solicited.

To the extent necessary, applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to the deposit account of Antonelli,

Terry, Stout & Kraus, LLP, Deposit Account No. 01-2135 (Case: 520.42912X00), and please credit any excess fees to such deposit account.

Respectfully submitted,

ANTONELLI, TERRY, STOUT & KRAUS, LLP



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